

know it

Närhet. Kunskap. Engagemang.

Architecture in Future Cars – a Challenge Supported by the Vinnova MARCH Project

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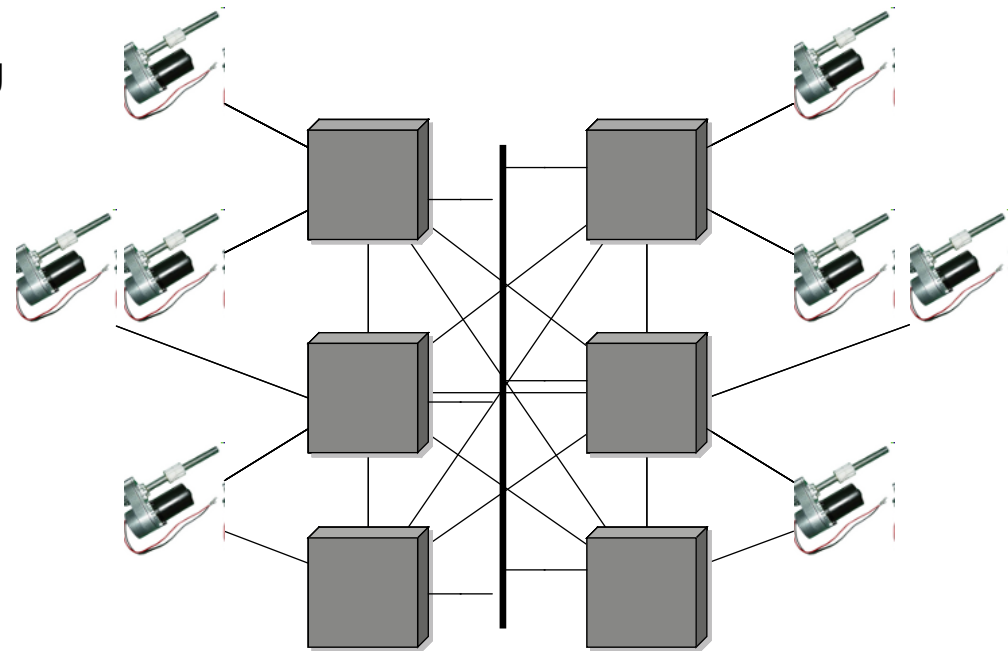


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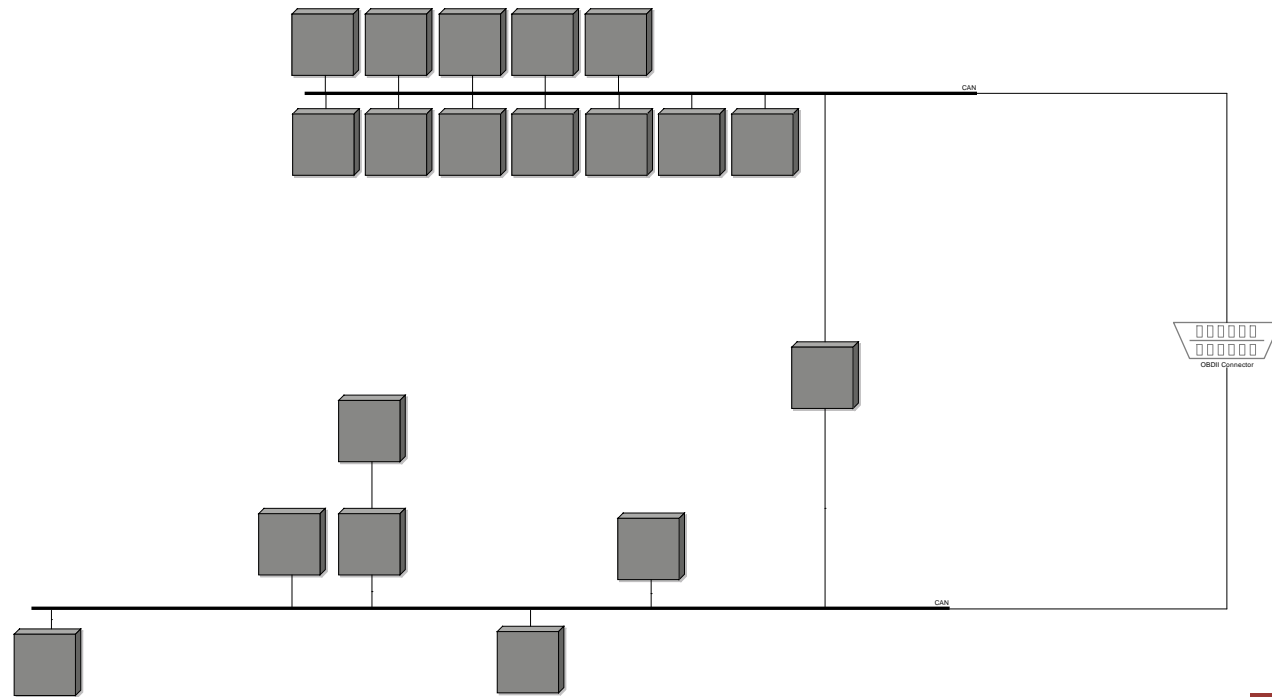
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Retrospective: Why in-car networks?

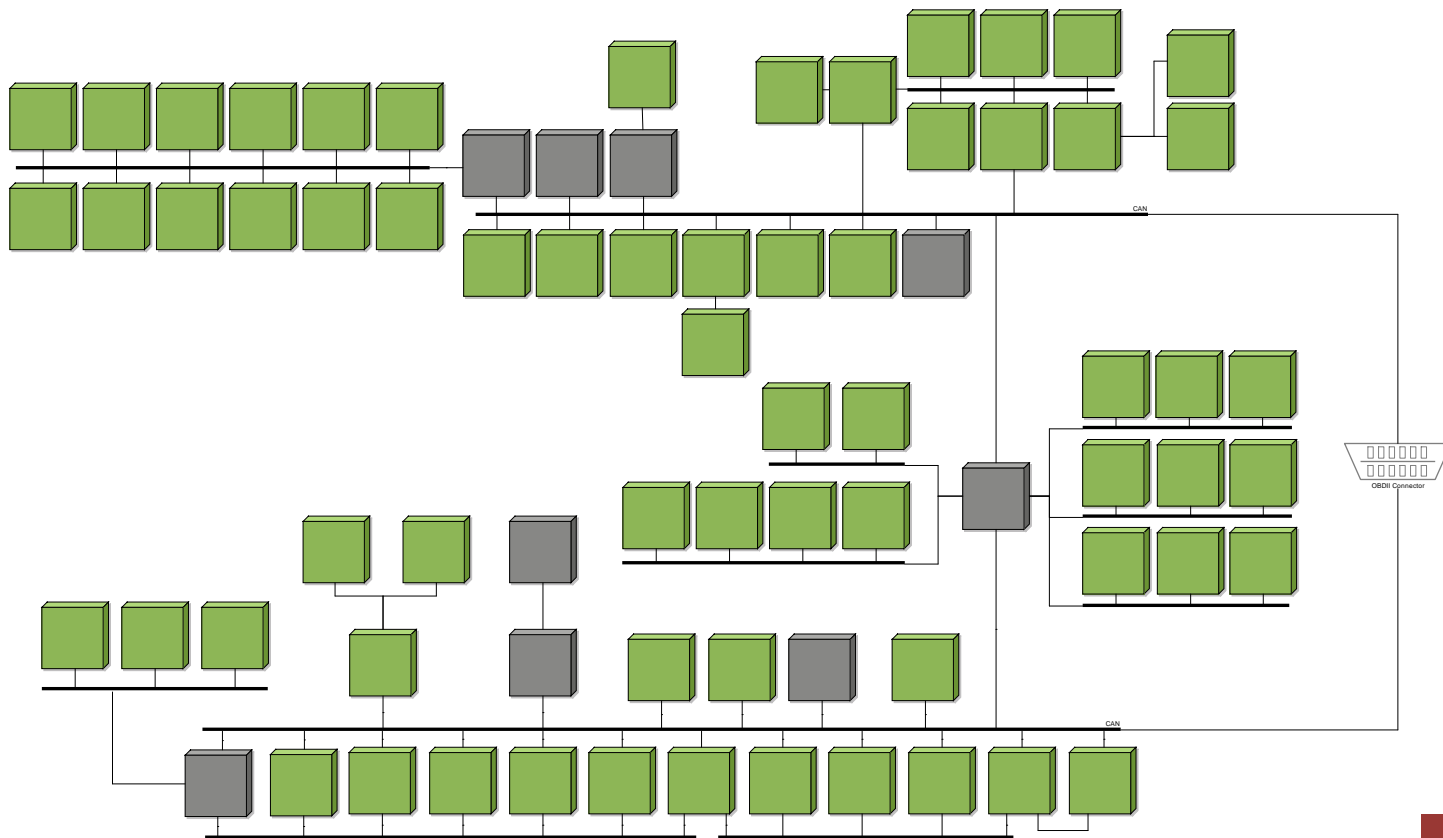
1. Single system with controller and devices.
2. Multiple, isolated systems
3. Information sharing by wiring
4. Lack of space → CAN bus



Topology 1998: ~20 ECUs, 2 CAN networks

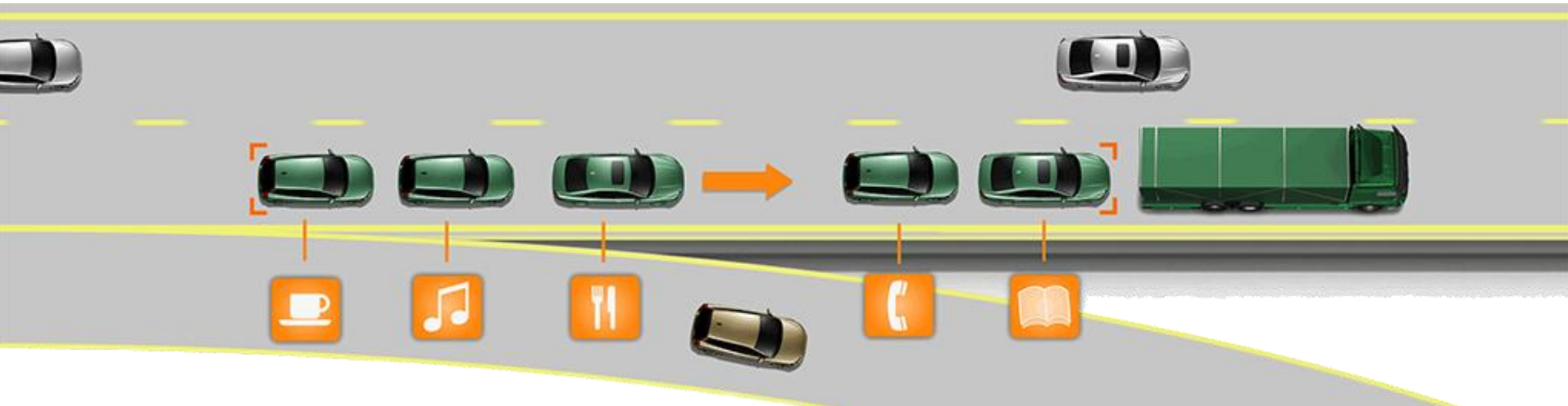


Topology 2012: ~80 ECUs, inherited from 1998



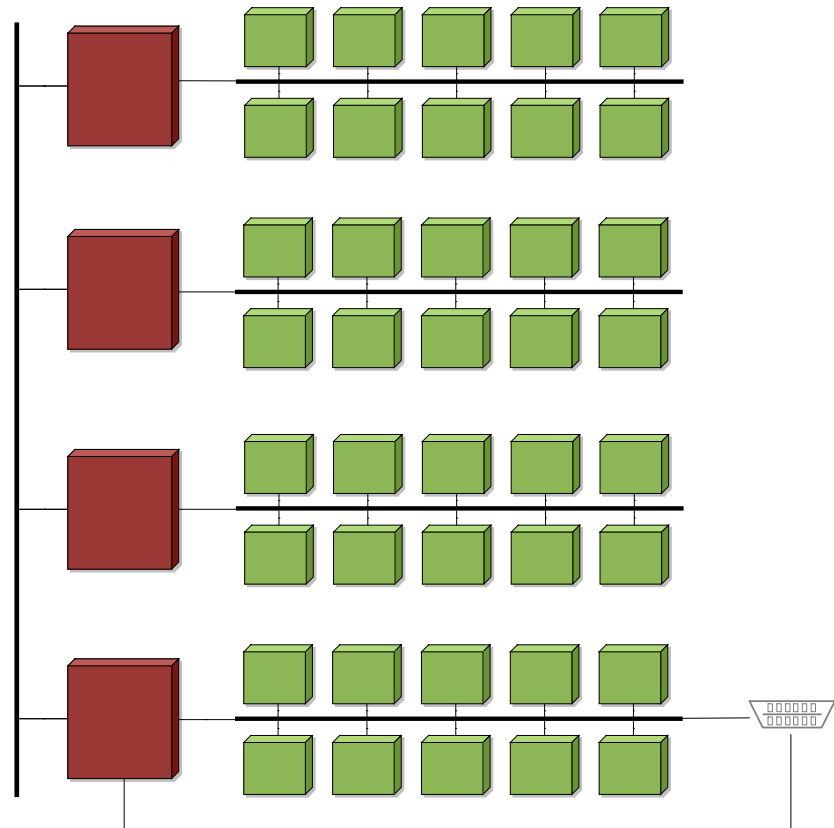
Tomorrow

- Situation awareness
- Manoeuvres will involve many devices (actuators and sensors)
- Decisions cannot be decided on device level



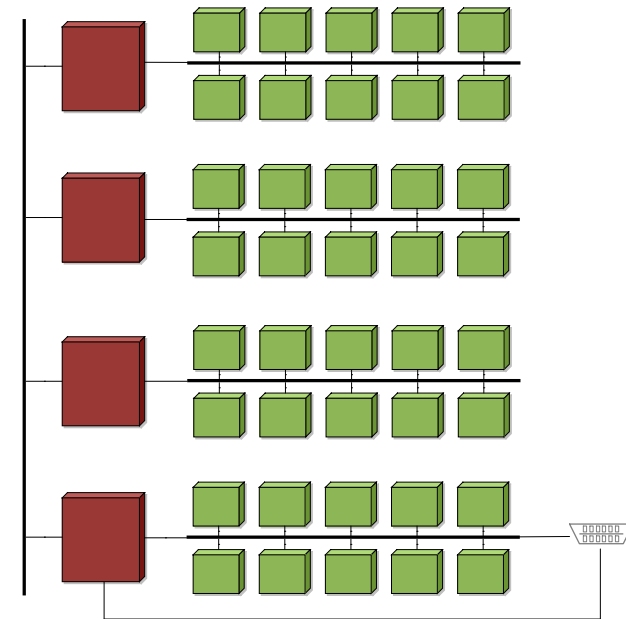
Next generation architecture

- Subsystem partitioning
- Master nodes (ECUs)



Consequences (and vision)

- Centralised decision making — OEM IP in master nodes
- Enables complexity-reduction of standard nodes
- Fewer nodes
- Reduced bus load within sub-nets
- Paradigm shift:
 - AUTOSAR necessary
 - Software may be purchased separately from hardware
 - New business model needed
 - Liability and responsibility between/within OEM and suppliers:
Function – Subsystem – ECU – Component



Model based approaches will be needed

- Dramatic increase of functional, dynamic and algorithmic complexity raises need for effective work with:
 - Well-defined component interfaces
 - Identifying organisational responsibilities and liabilities
 - Increasing precision of requirements
 - Iterative work
- Focus shift:
 - OEM IP in master nodes: Specification activities → Design activities
 - Standard nodes: Detailed specification → Interfaces and observable behaviour

Model based approaches will be needed, cont'd

- Communication between people
 - Visual, graphical notation
 - Introduction(!) of abstraction levels and aspect-oriented views (this is not common practice in automotive...)
- Increased knowledge of our systems and components will enable:
 - Re-use
 - Earlier and extended verification and validation

MARCH

Methodologies for Architecture Development and Evaluation DFEA2020 Sub Project 2

- Architectural paradigm shift must be supported by new processes and methods
 - Present processes and methods based on existing architectures and organisation
 - Development must excel to achieve excellent products... of course
- MARCH shall — based on current operations in the automotive industry, which are *function-centric* and *document driven* — define strategies and methods to support *architectural-centric* design, utilizing model-based approaches.
- MARCH is a co-operation between **Vinnova, Volvo Car Corporation** and **Know IT Technology Management**